THE EFFECTS OF PROMPTING AND REINFORCEMENT ON SAFE BEHAVIOR OF BICYCLE AND MOTORCYCLE RIDERS

TAKERU OKINAKA AND TSUNEO SHIMAZAKI

KWANSEI GAKUIN UNIVERSITY

A reversal design was used to evaluate the effects of vocal and written prompts as well as reinforcement on safe behavior (dismounting and walking bicycles or motorcycles on a sidewalk) on a university campus. Results indicated that an intervention that consisted of vocal and written prompts and reinforcement delivered by security guards was effective at increasing safe behavior exhibited by bicycle and motorcycle riders. No differences were observed between vehicle type or gender with regard to engagement in safe behavior.

Key words: community behavior analysis, pedestrian safety, prevention, prompting, traffic safety

The number of road accidents between bicycles and pedestrians has more than tripled within the last decade in Japan, from 801 in 1999 to 2,934 in 2009 (Traffic Bureau of National Police Agency, 2010). The Road Traffic Act prohibits bicycle and motorcycle use on sidewalks (except for greenways), because it disturbs pedestrians and increases the risk of injury. To prevent injuries, it is necessary for bicycle and motorcycle riders to behave safely on sidewalks.

Previous studies have demonstrated the effectiveness of prompts on safe behavior, such as safety belt use (e.g., Clayton & Helms, 2009) and obeying stop signs (Austin, Hackett, Gravina, & Lebbon, 2006). For example, Clayton and Helms (2009) used a prompting procedure that consisted of presenting a sign (e.g., ''Please Buckle Up—I Care'') to drivers and flipping the sign to reveal a consequence (e.g., ''Thank you'') contingent on compliance (i.e., safety belt usage). Other studies have demonstrated the effectiveness of vocal prompts for increasing safe behavior. For example, several studies evaluated the effects of vocal prompts delivered by grocery clerks (''Don't forget to buckle up'') on safety belt use and demonstrated a subsequent increase in safe behavior (e.g., Austin, Alvero, & Olson, 1998; Engerman, Austin, & Bailey, 1997; Gras, Cunill, Planes, Sullman, & Oliveras, 2003). The purpose of the present study was to evaluate the effects of an intervention package consisting of vocal and written prompts combined with reinforcement on safe behavior exhibited by bicycle and motorcycle riders who used a sidewalk at a large university in Japan.

METHOD

Participants and Setting

The study was conducted on a straight sidewalk (3 m wide and 90 m long) on a campus of a large private university (approximately 25,000 students) in Japan. Participants included riders of bicycles and motorcycles who drove on a campus sidewalk. A total of 508 riders were observed during the course of the study (18 sessions). Data collection took place during a student break time when pedestrian traffic was busy on Mondays, Tuesdays and Wednesdays, between 10:30 a.m. and 11:00

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Correspondence concerning this article should be addressed to Takeru Okinaka, Graduate School of Humanities, Kwansei Gakuin University, 1-155 Ichiban-cho, Uegahara, Nishinomiya-City 662-8501, Japan (e-mail: t-okinaka@kwansei.ac.jp).

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a.m. One session was conducted per day. Although no accidents had occurred in the past on this sidewalk, the area had been designated as a potentially hazardous place for pedestrians, and, as such, riders were not allowed to ride there. A university Student Affairs staff member had deployed security guards to prevent possible accidents between riders and pedestrians. In addition, a sign instructing riders to get off and walk vehicles on the university campus was located at the entrance to this area and was present during all conditions. Consent for this study was obtained through the Student Affairs Department. Seven male security guards (all of them 60 to 70 years old) agreed to participate in the study. For the duration of the study, no penalties were administered if riders were noncompliant with prompts.

Response Measurement and Interobserver Agreement

Data were collected on safe behavior, type of vehicle (bicycle or motorcycle), and gender of bicycle and motorcycle riders. Safe behavior was defined as riders getting off and walking vehicles on the sidewalk. Instances in which riders switched off their engines but failed to get off their motorcycles were not recorded as occurrences of safe behavior. Observers recorded data while sitting on the side of the footpath. An average of 32.6 riders (range, 14 to 59) were observed during each observation.

Interobserver agreement data were collected by having a second observer independently collect data for 50% of all sessions. Agreement was calculated by dividing the total number of agreements (both observers recorded the same state of riders, the same type of vehicle, and the same gender) by the total number of agreements plus disagreements and multiplying by 100%. Agreements for safe behavior, type of vehicle, and gender of riders were 94%, 96%, and 94%, respectively.

Design and Procedure

A reversal (BABAB) design was used to evaluate the intervention. Throughout the study, security guards were visible from the sidewalk during student break times. During baseline, security guards provided no prompts and did not wear the sashes present during the intervention. During intervention, one security guard was present near the start of the sidewalk during each session. The security guards wore sashes that read, ''Let's not drive on campus.'' In addition, after each occurrence of riders failing to stop and walk their vehicles, the security guard provided the vocal prompt, ''Please get off and push vehicles to parking lots for safety on campus.'' The security guards thanked riders (''Thank you for your cooperation'') who dismounted after the prompt.

Before implementing the intervention, the first author trained security guards to implement the procedures via manuals and role play. The manual included descriptions of the procedures for vocal prompting and provided examples of appropriate and inappropriate instances of vocal prompting. During the role-play activity, the security guards practiced vocally prompting riders on a sidewalk.

RESULTS AND DISCUSSION

Figure 1 shows the results of the evaluation. During the initial intervention phase, 89% (range, 73% to 100%) of riders engaged in safe behavior (i.e., did not drive on the sidewalk). During baseline, 21% (range, 19% to 25%) of riders exhibited safe behavior. During the second intervention phase, 87% (range, 79% to 97%) of riders engaged in safe behavior. During the subsequent return to baseline, 23% (range, 12% to 33%) of riders exhibited safe behavior. During the final intervention phase, 87% (range, 78% to 95%) of riders exhibited safe behavior. For the three intervention phases, the percentages of bicycle and motorcycle riders who exhibited safe behavior were 89% and 85%, respectively, and the percentages of male and female riders who engaged in safe behavior were 87% and 94%, respectively. Overall, the mean percentage of safe behavior was 88%

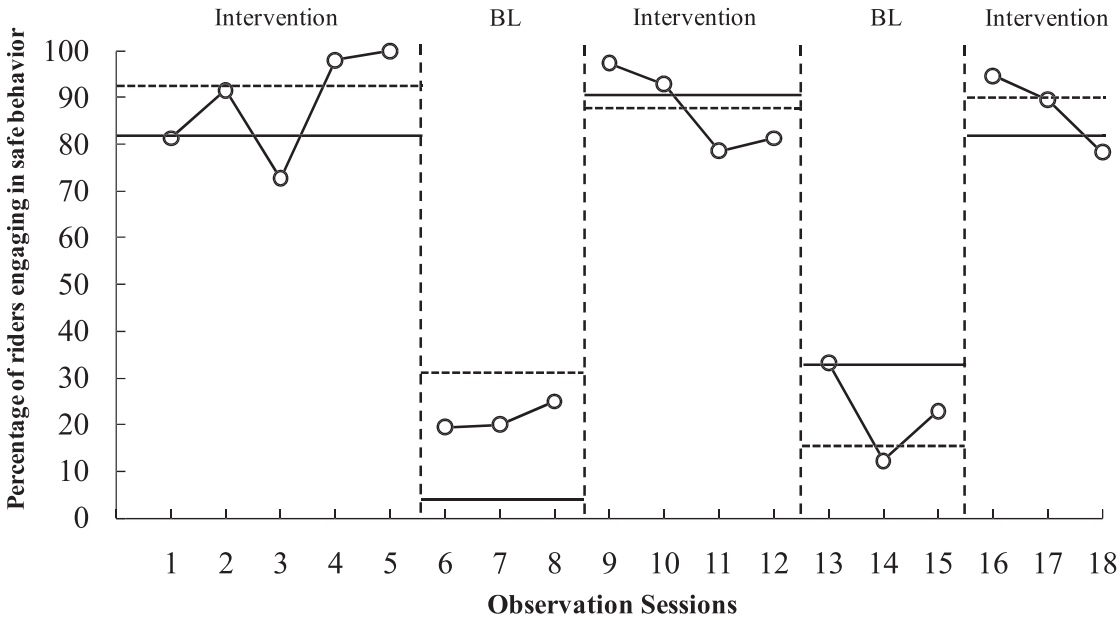

Figure 1. The percentage of bicycle and motorcycle riders who engaged in safe behavior across intervention and baseline (BL). The solid line and dashed line show mean percentages of motorcycle riders and bicycle riders who engaged in safe behavior, respectively.

during the intervention and 22% during baseline.

These results indicated that vocal and written prompts and reinforcement increased safe behavior of bicycle and motorcycle riders. These findings suggest that prompting procedures may be applicable to other community safety behaviors. Many studies have examined the effect of prompting when law enforcement was in effect (e.g., Clayton & Helms, 2009). For the duration of this study, however, consequences such as fines for noncompliance were not applied if riders did not comply with prompts from security guards. Thus, the results suggested that prompting was effective in the absence of these consequences, at least in the short term. However, it is also possible that vocal prompts had a punishing effect on unsafe behavior (i.e., riding on the sidewalk).

It was presumed that dismounting and walking motorcycles would require more response effort than getting off and walking bicycles. However, despite the presumed difference in response effort, levels of safe behavior were similar across vehicle type. Although previous studies (e.g., Fletcher, 1995) have suggested that men are less likely to follow posted rules in public settings, no differences were observed in terms of gender in the current study.

During the intervention, informal observations suggested that riders were dismounting on the sidewalk before they were exposed to security guards' vocal prompts. This suggested that the presence of security guards with sashes functioned as an antecedent. Anecdotal observations also suggested that implementation of the intervention varied across security guards (e.g., at times, some security guards used prompts such as ''Please get off the vehicle''; other security guards failed to thank riders) or changed gradually with time (e.g., intermittent thanking by some security guards). This limitation should be addressed in future research through the evaluation of procedures for ensuring the integrity of the intervention.

Although the vocal and written prompts and reinforcement were effective at increasing the safe behavior of bicycle and motorcycle riders, the effects were not maintained in subsequent baseline conditions. This should be considered a limitation in that it might be difficult to deploy security guards at all times due to cost. Therefore, future research should develop more cost-effective strategies, such as feedback signs (e. g., Okinaka & Shimazaki, 2010; Van Houten, Nau, & Marini, 1980; VanWagner, Van Houten, & Betts, 2011), that may be effective in the absence of security guards.

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